CLAIMS

We claim:

1. A gas detector comprising:

a first electrically conductive material layer;

an electrically nonconductive material layer disposed on the first electrically conductive material layer;

a second electrically conductive material layer disposed on the electrically nonconductive material layer;

a gas source in fluid communication with the second electrically conductive material layer; and

a power source in electrical communication with the first and second electrically conductive material layers.

2. The gas detector according to claim 1, wherein the first electrically conductive material layer contains a metal selected from the group consisting of aluminum, magnesium, chromium, titanium and zirconium.

3. The gas detector according to claim 1, wherein the second electrically conductive material layer contains a metal selected from the group consisting of silver, gold, platinum, rhodium, iridium, palladium, ruthenium, and osmium.

4. The gas detector according to claim 3, wherein the second electrically conductive material layer contains gold.

5. The gas detector according to claim 1, wherein the electrically nonconductive material layer contains at least one compound selected from the group consisting of aluminum oxide, magnesium oxide, chromic oxide, titanium dioxide, zirconium oxide, and silicon dioxide.

6. The gas detector according to claim 1, wherein the gas detector is capable of detecting sulfur dioxide.

7. The gas detector according to claim 1, wherein the power source is a direct current power source.

8. The gas detector according to claim 1, wherein the power source is an alternating current power source.

9. A method of determining the presence of a gas, the method comprising determining the change in impedance of a tunnel junction device upon exposure to a gas sample, wherein the tunnel junction device contains a first electrically conductive material layer, an electrically nonconductive material layer disposed on the first electrically conductive material layer, and a second electrically conductive material layer disposed on the electrically nonconductive material layer, and wherein the first and second electrically conducting layers are in electrical communication with a power source.

10. The method according to claim 9, wherein the gas to be detected is sulfur dioxide.

11. The method according to claim 9, wherein the first electrically conductive material layer contains a metal selected from the group consisting of aluminum, magnesium, chromium, titanium and zirconium.

12. The method according to claim 9, wherein the second electrically conductive material layer contains a metal selected from the group consisting of silver, gold, platinum, rhodium, iridium, palladium, ruthenium, and osmium.

13. The method according to claim 12, wherein the second electrically conductive material layer contains gold.

14. The method according to claim 10, wherein the gas is obtained from wine.

15. The method according to claim 9, wherein the power source is a direct current power source.

16. The method according to claim 9, wherein the power source is an alternating current power source.

17. The method according to claim 9, wherein the first and second electrically conducting layers are placed in electrical communication with a direct current power source and an alternating current power source and wherein the direct current and alternating current impedances are measured before and after exposure of the second conducting material layer to the sample.

18. A method of making a gas detector comprising:

forming a first electrically conductive material layer;

disposing an electrically nonconductive material layer on the first electrically conductive material layer;

disposing a second electrically conductive material layer on the electrically nonconductive material layer;

placing the first and second electrically conducting layers in electrical communication with a power source.

19. The method of claim 18, wherein the second electrically conductive layer is selected from the group consisting of silver, gold, platinum, rhodium, iridium, palladium, ruthenium, and osmium.